Seasonal Patterns in Largemouth Bass Diet Composition in the Sacramento-San Joaquin Delta

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Largemouth Bass on the Rise

• Largemouth Bass (LMB), *Micropterus salmoides*, have increased in abundance in the Sacramento-San Joaquin Delta in recent years. This increase is concurrent with declines in many pelagic species.

• LMB are voracious predators, yet few studies have been conducted since the Pelagic Organism Decline (POD) to determine their diet composition

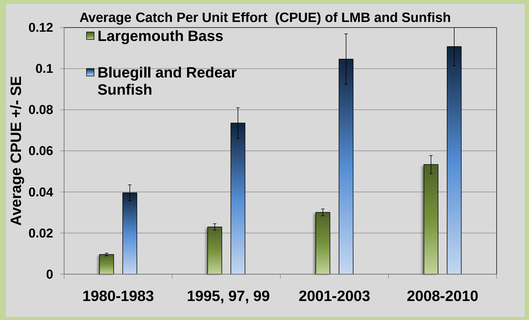

Fig. 1. Source: CDFG and UCD electrofishing surveys

Research Objectives

• Describe diet composition by:

Season- Winter, Spring, and Summer/Fall

Body size- Range: 35-647mm fork length (FL). We grouped samples where FL ≤ 150mm (largely juveniles) and FL > 150mm (largely adults).

Habitat- Variation in biomass of submerged aquatic vegetation (SAV), categorized as follows: None/Little =<75g; Intermediate=75-700g; Heavy= >700g (average biomass of SAV sampled)

Methods

• We surveyed 33 sites (Fig. 2) across the Delta via boat electrofishing and collected rake samples for vegetation. We have collected 2,372 diet samples between October 2008-2009.

• Index of Relative Importance = (% by number + % by volume) x (% frequency of occurrence).

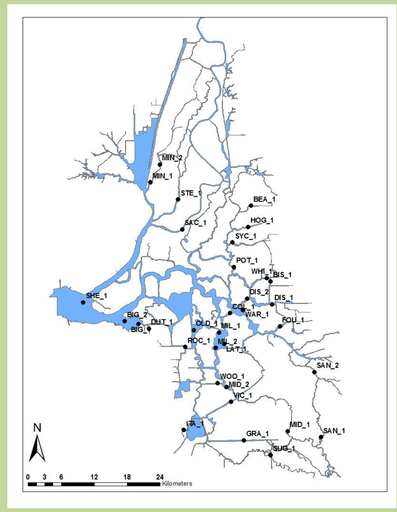

Fig. 2. Map of 33 electrofishing and SAV survey sites.

Species	# Presences
Prickly Sculpin	54
Largemouth Bass	42
Bluegill Sunfish	27
Redear Sunfish	20
Bullhead Catfish	23
Gobies	16
Mississippi Silverside	8
Golden Shiner	5
Sacramento Blackfish	2
Tule Perch	2
Striped Bass	1
Unidentified Centrarchid	138
Unidentified Fish	321

Fig. 3. Fish species observed in LMB stomachs, by number of times present out of 2,372 samples collected.

Results

=fish, =shrimp and crayfish, =small crustaceans[1], =Insects[2]

1 Amphiphoda (Gammaridae, Hyalellidae, Corophidae); **2** Diptera, Odonata, Hemiptera, Trichoptera

Winter (December, February)

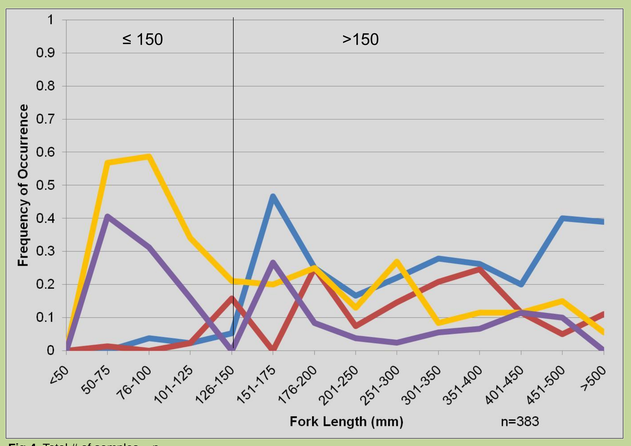

Fig 4. Total # of samples = n

Spring (April, June)

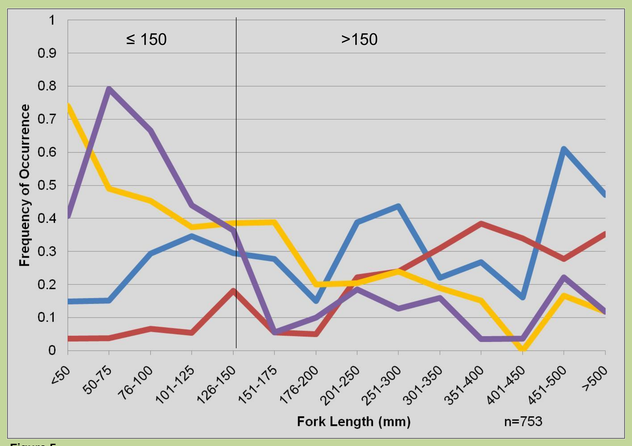

Figure 5.

Summer/Fall (August, October)

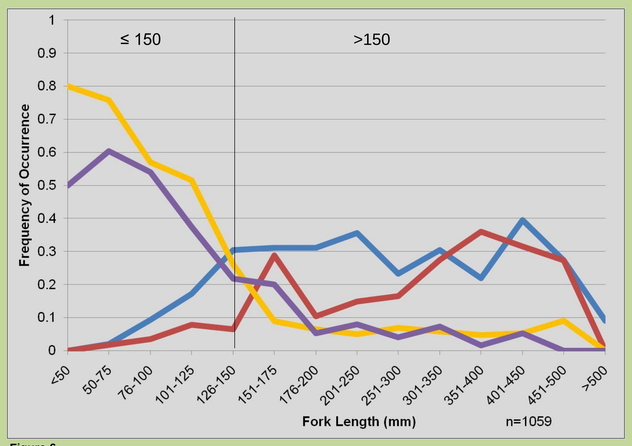

Figure 6.

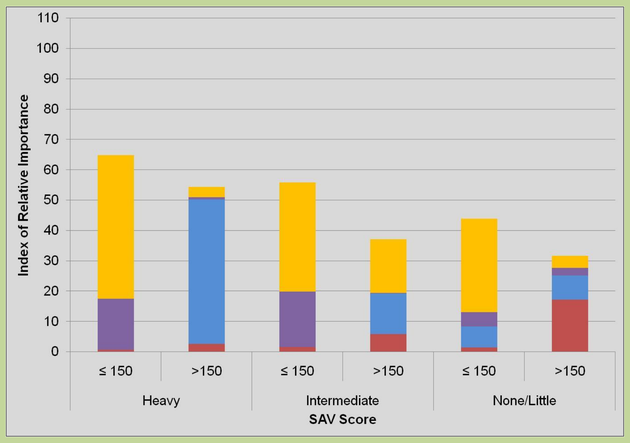

Figure 7. Juvenile total samples=217; Adult total samples=328.

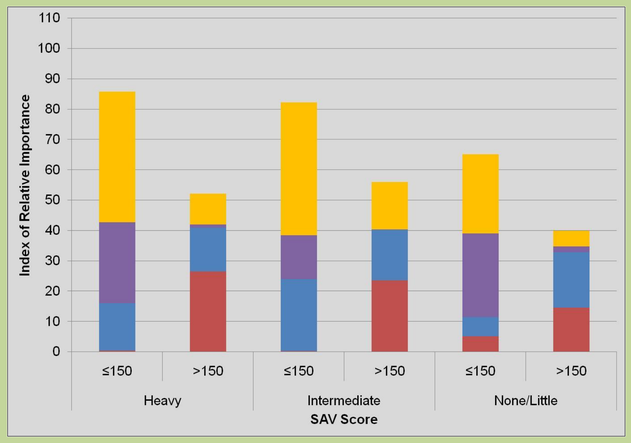

Figure 8. Juvenile total samples=274; Adult total samples=440

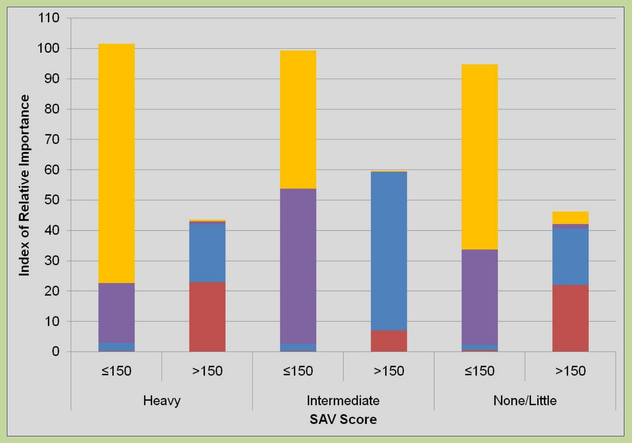

Figure 9. Juvenile total samples=585; Adult total samples=489

• Juvenile insect consumption has a high frequency of occurrence; however, the # of insects consumed drops significantly in None/Little SAV.
• Adults eat more fish in heavy SAV where IRI is higher. This level drops in None/Little SAV and decapods significantly increase

• Fish consumption occurs for juveniles and adults across all SAV levels. Decapods are at the highest frequency of occurrence across all seasons for adults.
• Insects are present in the gut of Juveniles at a higher frequency than small crustaceans

• Overall consumption is higher for Juveniles in all SAV categories throughout the year.
• Adults consume less fish in Heavy SAV and None/Little SAV

Conclusions

• Across all seasons, smaller LMB consume primarily insects and small crustaceans while larger LMB mostly eat other fish and crayfish.

• Small LMB also consume other juvenile fish during spring months (Fig. 5) after the spawning period for many Delta fishes. Juvenile LMB acquire fish prey in habitats with intermediate or heavy SAV densities (Fig. 8).

• Fish prey are likely the highest quality (most energy dense) of all prey items available. Thus, SAV habitats function as food-rich nursery habitats for juvenile LMB in the spring.

• Adult consumption of other fish varies by season and across SAV densities.
  • High SAV densities in the winter promote predation of other fish (Fig. 7)
  • In the summer when overall SAV densities are highest, adult bass consume the most fish at intermediate SAV densities.

• Nearly all the fish prey found in LMB stomach contents were identified as common species in littoral habitats, suggesting that predation of pelagic species is rare.

Acknowledgements

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